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ABSTRACT

In this study, the data originally used by Hemphill, Griffiths, and Frederiksen in their "Whittman" study of principals' behavior patterns were factor analyzed using psychometric techniques. Results of the analysis substantiated four of the eight originally defined dimensions of administrative behavior, and an additional important factor termed "taking a course of action" was also identified. In his discussion, the author considers ways of reducing the complexity of current administrative behavior theories and offers some recommendations regarding the psychometric properties of data sets collected for administrative research. (Author/JG)

ADMINISTRATIVE PERFORMANCE AND PERSONALITY: SOME FURTHER PERSPECTIVES

By

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In their now classic study of the "Whittman School," Hemphill, Griffiths and Frederiksen (1962) structured eight primary dimensions of administrative behavior. Those factors have been used extensively to determine diagnostic profiles for aspiring and practicing administrators. Through use of the materials and procedures developed from their data, one is able to gain insights into his administrative style. At one time or another in an attempt to simulate his/her administrative actions, many in Division A have participated in the in-basket exercise. The major objectives of the original study were:

1) To determine performance dimensions in the elementary school principalship in order to gain a better understanding of the nature of the job.

2) To gather data relevant to the problem of selecting school administrators.

3) To provide materials and instruments for the study and teaching of school administration.

To achieve these, an administrative vignette was contrived in which responses might be elicited and recorded with respect to the fundamental tasks of the principal's job. A portion of that experience included the in-basket exercise. The two hundred thirty-two principals participating in the study were scored on each of sixty-eight categories:

Estimated Number of Words
Usual Courses of Action
Number of Subordinates Involved Individually
Number of Superiors Involved
Number of Outside Groups Involved
Gives Recognition for Ability or Good Work
Carelessness or Minor Error
Relates to Background Materials or Other Items
Uses Human or Personal Values in Analysis
Number of Items Not Attempted
Rejection of Test Conditions
Number of Subordinate Groups Involved
Number of Outsiders Involved Individually
Unusual Courses of Action
Shows Awareness of Poor Work
Socially Insensitive
Conceptual Analysis
Prejudges, Makes Unwarranted Assumption, or Largely Inappropriate Perception
Uses Physical Values in Analysis
Uses Program Values in Analysis

- Discusses with Subordinates
- Asks for Information, Opinion, Advice, or Permission from Subordinates
- Asks for Information, Opinion, Advice, or Permission from Outsiders.
- Arrives at a Procedure for Deciding
- Makes Tentative or Definite Plans Only
- Work Scheduled for Same or Following Week
- Takes Leading Action
- Follows Lead by Subordinates
- Follows Lead by Outsiders
- Coordination
- Delegates Completely
- Delegates Partially, but Without Control
- Communicates Face-to-Face
- Communicates by Writing
- Gives Information to Superiors
- Explains Actions to Subordinates
- Explains Actions to Outsiders
- Courtesy to Superiors
- Informality to Superiors
- Backs Up Teachers or Staff Officers
- Attempts to Improve the Working Conditions of the Staff
- Discusses with Superiors or Outsiders
- Asks for Information, Opinion, Advice, or Permission from Superiors
- Requires Further Information
- Delays or Postpones Decision or Temporizes
- Contingent Decision
- Concluding Decision
- Work Scheduled for Same or Following Day
- Work Scheduled: Indefinite Time or No Time Specified
- Takes Terminal Action
- Follows Lead by Superiors
- Follows a Pre-established Structure
- Initiates a New Structure
- Delegates Partially with Control
- Gives Directions and/or Suggestions
- Refers to Superiors
- Communicates by Telephone
- Gives Information to Subordinates
- Gives Information to Outsiders
- Explains Actions to Superiors
- Courtesy to Subordinates
- Courtesy to Outsiders
- Informality to Outsiders
- Improves Staff
- Imposes Controls: Sets a Deadline
- Imposes Controls: Follow-Up or Feedback Planned

The reliabilities of those measures ranged from .97 to .01. The forty categories with the highest model response were selected for further analysis. After contemplation of Tucker's (1958) inter-battery method of factor analysis, the authors conducted a principal factor analysis of the 40 x 40 correlation matrix using the largest row entries as a communality estimates. The raw pattern coefficients were both orthogonally and obliquely transformed. The resulting first order factors were:

A) Exchange of Information
B) Discussing Before Acting
C) Complying with Suggestions
D) Analyzing the Situation
E) Maintaining Relationships
F) Organizing Work
G) Responding to Outsiders
H) Directing Others

Plan of the Present Study

The original in-basket correlation matrix as determined by Hemphill, Griffiths, and Frederiksen was used as the basis of this study.(1) The intent was to reanalyze those data according to a strategy recently outlined by Harris and Harris (1971) in the search for common comparable factors (CCF). The essence of the procedure involves subjecting the matrix to several factor analytic models (Alpha, R - S^2, Unrestricted Maximum Likelihood) and transforming the patterns both orthogonally and obliquely. The intent is to identify factors which prove robust with respect to all methods--the strategy serves as a safeguard against dimensions which result as artifacts of a particular model.

Prior to the application of the strategy, it was intended to assess the psychometric adequacy of the matrix using the Kaiser-Rice (1974) Measure of Sampling Adequacy (MSA):

$$MSA = \frac{\sum\sum_{j \neq k} q^2_{jk}}{\sum\sum_{j \neq k} q^2_{jk} + \sum\sum_{j \neq k} r^2_{jk}}$$

(1)The matrix is found on pages 132 and 133 of Administrative Performance and Personality (Hemphill, Griffiths and Frederiksen, 1962). Rows 16 and 17 are missing, however, but may be obtained from Charles Dziuban or The Bureau of Publications, Teachers College, Columbia University.

where q^2jk is a squared element of the anti-image correlation matrix $(SR^{-1}S)$ (the element $S^2 = \left[\text{diag } R^{-1}\right]^{-1}$) and r^2jk is an element of the original correlation matrix. A similar measure may be defined for individual variables:

$$MSA\ (j) = \frac{\sum_{\substack{k \\ k \neq j}} r^2jk}{\sum_{\substack{k \\ k \neq j}} r^2jk + \sum_{\substack{k \\ k \neq j}} q^2jk}$$

The measures (including individual indices) lie between zero and one. The overall index gives indication of the degree to which the variables "belong together psychometrically"--comprise an adequate sample from some domain. The individual MSA demonstrates to what degree a particular variable "belongs to the family" psychometrically. Recently several studies have been conducted (Dziuban and Shirkey, 1974A; Dziuban and Shirkey, 1974B; Dziuban and Shirkey, 1976) which demonstrate that the MSA is monotone to the right thing regarding the factorability of a given correlation matrix.

Upon the initial attempt, however, to factor the forty variables the determinant was found to be $.984 \times 10^{-16}$, a number so close to zero as to render the matrix singular. This, of course, makes it impossible to complete the above procedures (without the use of generalized inverses). Accordingly, a secondary analysis strategy was used. Of the above-mentioned factoring procedures, the alpha method (Kaiser and Caffery, 1965) was selected because it may be initiated with communality estimates other than squared multiple correlations.

The procedure is a psychometric one and yields factors of maximum generalizability in the sense of Cronbach's alpha:

$$\alpha i = \frac{N}{N - 1}\left(\frac{\lambda - 1}{\lambda}\right)$$

where N is the number of variables and λ is the eigenvalue of the i^{th} factor. The raw patterns were transformed according to the direct oblimin criterion ($\Delta = 0$). Coefficients absolutely greater than .4 were used for interpretation purposes.

The two factor intercorrelation matrices (L) were also subjected to sampling adequacy analysis as well as the determination of the individual and overall root mean square correlation for each. No attempt was made to derive second order factors from these data.

Results

The transformed pattern matrix is presented in Table One. Of the ten retained factors, five were interpretable. Those factors were:

FACTOR I	Item #			Alpha Coef.
	14	Discusses with Subordinates	-.72	
	19	Decides on Procedure	.54	
	24	Indefinite Work Scheduled	-.59	.948
	26	Terminal Action	.71	
	31	Initiates Structure	-.52	
	33	Communicates Face-to-Face	-.66	

It was clear that this first factor was the "Discussing Before Acting" dimension.

FACTOR II	Item #			Alpha Coef.
	4	Subordinates Involved	-.46	
	21	Plans Only	.76	
	25	Leading Action	-.77	.930
	32	Directs	-.62	
	35	Communicates by Writing	-.73	
	38	Courtesy to Subordinates	-.66	

This was the "Directing Others" dimension.

FACTOR III	Item #			Alpha Coef.
	2	Items Omitted	-.75	
	20	Concluding Decision	.85	
	26	Terminal Action	.65	.904
	27	Follows Subordinates	.68	
	28	Follows Superiors	.53	

This third alpha factor, an original subset of "Discussing Before Acting," emerged separately and was entitled "Taking a Course of Action."

FACTOR V	Item #			Alpha Coef.
	9	Aware of Poor Work	-.41	
	12	Conceptual Analysis	-.95	.774
	13	Program Values	-.75	

This factor emerged as the "Analyzing the Situation" dimension.

FACTOR VI	Item #			Alpha Coef.
	22	Immediate Work Scheduled	.66	
	23	Intermediate Work Scheduled	.62	.740
	24	Indefinite Work Scheduled	-.67	

This factor was termed "Organizing Work" as it was in the original study. The only dimension appearing in this analysis which was separate from the original results was "Taking a Course of Action." In the Hemphill, Griffiths and Frederiksen research this was related to the more comprehensive factor--Discussing Before Acting.

The intercorrelations among the factors in the original study and the alpha results are presented in Tables Two and Three. It appears that the interrelationships among the factors were much less for the alpha study. This is verified by a root mean square correlation of .35 in the original study (Table IV) and .20 in the alpha study. This, of course, was a function of my choice of delta. The overall M.S.A. was indeterminant for the Hemphill, Griffiths, and Frederiksen matrix while a value of .76 was obtained for the Dziuban results.

Discussion

The purpose of this study was to validate the results originally obtained by Hemphill, Griffiths, and Frederiksen by determining to what degree the sample of forty in-basket categories represented an adequate sample from their domain of behavior and by identifying factors which were robust with respect to the methods used. Obviously the singularity of the correlation matrix prevented those methods from eventuating. So we find that the in-basket factors are based upon a matrix which is unfactorable in many respects. It seems that a reasonable explanation for this might be that substantial dependencies existed among the scoring categories. Further, the indeterminancy of the measures of sampling adequacy prevented the answer to the domain sampling question of the forty in-basket categories. Consequently, the only available "factoring" procedures were principal components or some method in which R^{-1} was not directly involved--thus the alpha procedure.

The results of this study produced some interpretable factors and some noise. Customarily alpha yields a lower bound to the correct number of factors but in this case resulted in two more than were extracted by Hemphill, Griffiths, and Frederiksen. The first factor identified was a compact version of the original "Discussing Before Acting," although eight of the original variables were not salient. "Discussing Before Acting" was the strongest dimension in this study, although it was second in the original research. It is related to "Arranging Face-to-Face Discussions Before Taking a Final Course of Action." Although it was the weakest in the original work, the next strongest factor in this study was comprised by six of the ten variables which were termed "Directing the Work of Others."

The third factor was composed of variables which were an original subset of "Discussing with Others before Acting" plus an additional variable--"Concluding Decision." It was virtually unrelated (r = -.08), however, to "Discussing" and appears to be a clearly separate dimension related to "Taking a Course of Action." It is the long sought after decision. The number of items omitted was negatively related to other variables so that omission of items would indicate an unwillingness to take a terminal action. The fourth identifiable factor (V) in this study corresponded exactly to analyzing the situation while the final factor was formulated by three variables from the original "Organizing Work" factor. It seems quite simply "Scheduling Work."

If the original and alpha factors are examined in the order of their strength, some interesting trends emerge:

Hemphill, Griffiths, Frederiksen	Dziuban
-Exchange of Information	Discussion Before Acting
Discussing Before Acting	Directing Others
-Complying with Suggestions	Taking a Course of Action
Analyzing the Situation	Analyzing the Situation
-Maintaining Relationships	Organizing Work
-Responding to Outsiders	
Directing Others	

"Exchange of Information" which was the strongest factor in the original work did not emerge in the Dziuban study. "Discussing Before Acting" was ranked second in the Hemphill, Griffiths, and Frederiksen research but emerged as the strongest dimension in the present study. It seems clear that "Discussing Before Acting" is an important dimension of these data. "Complying with Suggestions," a rather strong original factor, was not identified in the present research. "Analyzing the Situation," a moderately strong

factor in the Hemphill, Griffiths, and Frederiksen work proved to be one of the weakest in the reanalysis. (α = .774). Variables related to "Maintaining Relationships" did not replicate that dimension in the alpha study. "Organizing Work" appeared to be a fairly weak dimension in both studies. "Responding to Outsiders" was the final dimension which existed in the original work but failed to crystalize in the Dziuban study. Finally "Directing Others" which was the weakest factor in the Hemphill, Griffiths, and Frederiksen matrix proved the second strongest in the reanalysis.

So we have a situation in which four of the original dimensions of administrative performance could not be reproduced. Of greater interest is the fact that exchanging information was so sensitive to reanalysis that it disappeared. All four of the factors which failed to appear in a sense are related to maintenance functions--exchanging, complying, maintaining and responding. Of the original dimensions those which proved robust were related to discussion/direction - analysis/organization. Generally the compacted analysis seemed to de-emphasize the personal dimensions of administrative performance.

These results might suggest that several of the original in-basket factors are robust. They may also suggest, however, that there may be fewer relevant in-basket categories than originally outlined and that they are considerably more unrelated to each other. This would facilitate the development of independent scores on each of the factors. Accordingly, the simulation of administrative performance might be considerably simplified--a cross validation study of this needs to be undertaken to determine if recalibration is warranted. It may be that development of an objective typology is a possibility.

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TABLE ONE

Derived Pattern Matrix
(Direct Oblimin)

	1	2	3	4	5	6	7	8	9	10	h^2
1. Number of Words	-15	-21	24	-08	-16	13	08	-11	-31	-18	80
2. Items Omitted	22	07	-75	25	-20	-09	21	06	03	-00	95
3. Usual Action	-25	-00	21	-18	-19	02	16	-14	-31	-21	91
4. Subordinates Involved	-12	-46	14	-10	-11	13	20	-09	08	-27	80
5. Subord. Groups Involved	-29	18	20	14	-09	04	-01	-06	-14	-50	64
6. Superiors Involved	-01	-05	09	-10	-09	11	56	00	-07	09	45
7. Outsiders Involved	-16	00	11	-10	-11	-09	35	02	-53	01	75
8. Unusual Actions	-04	-21	00	-02	-18	01	21	-02	04	-34	44
9. Aware of Poor Work	-09	-06	-02	-23	-41	-11	13	-03	10	-06	36
10. Careless	-07	-11	02	60	00	-02	07	04	-04	-00	37
11. Relates to Other Materials	-00	-09	-15	-21	-06	26	35	-09	-08	-19	53
12. Conceptual Analysis	10	05	-08	05	-95	03	-03	-01	-04	-04	89
13. Program Values	05	05	07	09	-75	00	-05	-00	-03	06	53
14. Discusses with Subords.	72	-02	00	04	-01	17	02	-19	-01	-10	83
15. Discusses with Superiors	38	-07	01	-12	-12	04	37	-05	-20	18	57
16. Asks Subordinates	-11	-07	-23	-13	-20	-01	01	-28	-09	-35	57
17. Requires Information	09	10	-18	-00	-04	02	-05	-17	03	06	21
18. Delays	-03	-03	04	-26	-06	12	-54	04	01	14	39
19. Decides on Procedure	-54	-11	-03	-07	-10	19	10	-30	05	-09	86
20. Concluding Decision	30	06	85	02	-01	-15	18	16	-08	-09	95
21. Plans Only	-37	76	20	-19	-06	06	-08	-07	02	-06	88
22. Immediate Work Scheduled	-20	05	10	-07	06	66	-14	-20	06	-16	78
23. Intermediate Work Sched.	-09	-08	-09	-03	-12	69	03	-05	-02	03	54
24. Indefinite Work Scheduled	-59	07	13	-32	-08	-67	-06	-16	-06	-10	99
25. Leading Action	-13	-77	-03	-01	-07	07	09	-09	-09	-05	87

Derived Pattern Matrix (cont'd)

	1	2	3	4	5	6	7	8	9	10	h^2
26. Terminal Action	71	-11	65	22	07	-16	10	-57	06	22	99
27. Follows Subordinates	-12	10	68	04	06	-02	-05	-07	-16	-16	65
28. Follows Superiors	-17	-13	53	-06	-06	08	20	-03	-08	01	61
29. Follows Outsiders	-12	02	28	06	06	03	20	-04	-47	02	51
30. Follows Structure	07	-37	30	-09	-01	30	-00	04	15	-25	54
31. Initiates Structure	-52	-12	06	02	-15	08	12	-18	00	-23	78
32. Directs	-00	-62	15	-05	-21	14	10	00	-00	-19	83
33. Communicates Face-to-Face	-66	-02	13	-02	-04	21	10	-13	-06	-05	86
34. Communicates by Telephone	-14	24	01	-30	06	21	15	-09	-26	-08	46
35. Communicates by Writing	-00	-73	38	16	-05	-01	10	-02	-02	-06	89
36. Informs Subordinates	13	-21	04	-06	-02	02	02	-05	-19	-58	60
37. Informs Outsiders	17	04	02	-03	-05	-00	04	-00	-68	-15	54
38. Courtesy to Subordinates	-11	-66	-14	02	06	14	-08	-03	-10	-07	57
39. Courtesy to Outsiders	-02	-32	-05	16	-14	-03	-14	-03	-53	05	47
40. Informality to Subords.	-03	-37	10	-39	16	-09	05	-09	-01	-08	39

TABLE TWO

Factor Intercorrelations from the Original Study

A	B	C	D	E	F	G	H
.65							
-.15	-.19						
.37	.26	-.02					
.29	.22	.33	.20				
.56	.70	-.28	.17	.04			
-.38	.39	.35	.03	.07	-.44		
.57	.36	.00	.21	.29	.44	-.36	

Reprinted from Hemphill-Griffiths and Frederiksen

TABLE THREE

Intercorrelations of the Alpha Factors

1	2	3	4	5	6	7	8	9	10
00									
-08	-11								
37	00	-08							
28	16	-08	14						
-24	-20	-01	-15	-14					
-13	-20	20	-08	-18	04				
30	15	-18	24	26	-17	-18			
23	14	-22	-00	28	-05	-29	20		
29	26	-21	22	25	-22	-25	29	22	

TABLE FOUR

Measures of Sampling Adequacy and Root Mean Square Correlations for the Two Factor Intercorrelation Matrices

Original Study			Alpha Study		
Factor	MSA*	RMS	Factor	MSA	RMS
1	-	.45	1	.72	.25
2	-	.44	2	.67	.16
3	-	.23	3	.75	.15
4	-	.21	4	.69	.19
5	-	.23	5	.83	.21
6	-	.43	6	.73	.16
7	-	.33	7	.79	.19
8	-	.36	8	.85	.23
			9	.73	.21
			10	.82	.25

*MSA's Indeterminant (matrix singular)
Overall RMS = .35

Overall RMS = .20
Overall MSA = .76